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STUDIES IN THE MALACHIIDAE II

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TABLE OF CONTENTS

| | PAGE |
|---|------|
| Introduction | 113 |
| Discussion of Genera | 115 |
| Key to the Genera | 122 |
| <i>Collops</i> Erichson | 123 |
| <i>Trophimus</i> Horn | 124 |
| <i>Temnosophus</i> Horn | 124 |
| <i>Attalusinus</i> Leng | 124 |
| <i>Chaetocoelus</i> Leconte | 125 |
| <i>Malachius</i> Fabricius | 125 |
| <i>Tanaops</i> Leconte | 125 |
| <i>Anthocomus</i> Erichson | 126 |
| Key to the North American Species | 126 |
| <i>Acletus</i> Leconte | 132 |
| <i>Attalus</i> Erichson | 132 |
| Acknowledgments | 141 |
| References | 142 |
| Index | 143 |

INTRODUCTION

The purpose of the present paper is threefold: first, to present a generic revision of the family, with a new key to the genera; second, to offer a new key to the species of the revised genus *Antho-*

comus, which is made necessary by the inclusion in that genus of certain other groups of species; and third, to record some observations on various species which have been made since the publication of the first number of these Studies (1) and to describe a few new forms which have come to light since that time.

When such competent entomologists as Brown (2) (3) and Hopping (4) (3) redescribe species that have been known for many years, assigning them to genera other than those to which they are at present assigned, and Fall (5) (6) describes a species, *prolixicornis*, in the genus *Malachius* and then changes his mind, after sixteen years, and transfers it to *Microlipus*, because the thorax is somewhat narrowed posteriorly, it becomes rather obvious that something is wrong with the present generic set-up in the family. In 1917 Fall (6) pointed out that the characters which Horn (7) had used to separate the genera *Malachius* and *Microlipus* were not satisfactory and suggested that the species of *Microlipus*, with the possible exception of *moerens* Lec. and *longicollis* Mots., be transferred to *Malachius*. He did not suggest that the native North American species presently assigned to *Malachius* were not congeneric with the introduced European species, *aeneus* Linn., the type species of that genus, but noted that the antennae in that species "do appear to be a trifle more removed from the frontal margin" than in our other species of the genus.

More recently the present writer (1) investigated the species concerned and concluded that the native North American species now assigned to *Malachius* did not belong to that genus and that there were no differences of generic significance between those species and the species now assigned to *Microlipus*, citing the observations on which these conclusions were based. An examination of the three North American species of *Anthocomus* Erichson indicated further than there were no differences between them and the species just mentioned which could properly be regarded as of generic significance. If these observations were correct, the preparation of a new key, to include these three groups of species, was definitely indicated, but the matter was not pursued further at that time, for two reasons. In the first place, I did not know the genotype of *Anthocomus* and could form no opinion as to whether our three species had been properly placed in that genus and, in the second place, I was loath to make such a radical change in the arrangement of genera and species in the family, a considerable number of whose species had already been shifted back and forth from one genus to

another; and I wanted the opinion of a representative group of Coleopterists on the questions involved.

Accordingly, I wrote to eleven of my coleopterological friends, all of them nationally known, requesting them to check my published observations and to favor me with their opinion and criticisms. Three of them stated that they were not sufficiently acquainted with the Malachiidae to feel justified in expressing any opinion; but the remainder were unanimous in their agreement with my conclusions, insofar as they concerned the genera *Malachius* and *Microlipus*. Three of these latter further agreed that our species of *Anthocomus* should be included in the same genus with the other two groups, while five stated that they were either entirely unacquainted with *Anthocomus* or insufficiently so to warrant an opinion. It appears that the only species of *Anthocomus* which is at all common in collections in this country is *erichsoni* Lec. and the males of this species are much rarer than the females.

With this degree of moral support, I felt that I was on comparatively safe ground in combining the North American species of *Malachius* with those of *Microlipus*; but when it came to including our species of *Anthocomus* with the latter, I was practically on my own and felt that it was necessary to compare them carefully with the type species of that genus, as well as with the species of the other two genera. The status of *Hapalorhinus* Leconte, which is placed by Leng (8) as a synonym of *Malachius*, should also be considered in the present revision.

DISCUSSION OF GENERA

The original descriptions of the four genera involved, with a designation of the genotype of each, are here reproduced, since these descriptions are in scattered sources, not all of them easily accessible to many students and will be wanted by anyone who is sufficiently interested to check the present work.

Malachius Fabricius (9). "Palpi filiform, the last joint setaceous; maxillae unidentate; labium rounded, membranous; antennae filiform" (translation from the Latin). The genotype is *aeneus* Linn., designated by Latreille (10) in 1810.

Anthocomus Erichson (11). "Antennae distinctly 11-jointed; maxillary palpi filiform, the last joint subacuminate; clypeus transverse, short, membranous; labrum transverse, the apex truncate" (translation from the Latin).

"The antennae are inserted at the sides of the head and exactly

at the anterior border, 11-jointed, usually simply filiform, at times feebly serrate, in the males of *A. cardiacae* pectinate, the second joint smaller, the others of like size. The epistoma is short, half as long as the labrum, membranous. The labrum is much shorter than broad, squarely truncate anteriorly, rounded only at the front angles. It covers the tips of the mandibles. The palpi are filiform, the first and third joint of the maxillary palpi short, the second and fourth about equally long, the last more or less acuminate. The labial palpi are small, the first joint very short, the second and third about of equal length. The ligula is membranous, anteriorly rounded, as long as the labial palpi, or extends slightly beyond the latter. The tarsi are simple, not pubescent beneath, the first two joints of equal, the following two of decreasing length, the first joint of the posterior tarsi, however, somewhat shorter than the second. The claws are moderately small, the membranous appendages between them almost of their length. The segments of the under side of the abdomen are corneous, the sternites of the middle ones, however, interrupted in the center. The anterior tarsi are 5-jointed in both sexes."

"The species of this genus are all small, and easily recognizable by reason of the fact that the head is not lengthened anteriorly and strongly narrowed, the epistoma is narrow and membranous and the middle abdominal segments are membranous in the center" (translation from the German).

The genotype is *fasciatus* Linn., designated by Thomson (12) in 1859. In 1891, Abeille de Perrin (13), evidently unaware of Thomson's designation, gave *sanguinolentus* Fab. as the genotype of *Anthocomus* and Champion (14), in 1914, following his lead, designated the same species as the genotype. The error of these last two authors, an error provided there was no designation prior to that of Thomson, caused some confusion and considerable delay in the present study, since their designations were discovered before that of Thomson, and it was necessary to write to the British Museum on two separate occasions for examples of these species, which were kindly furnished me by Dr. Howard R. Hinton of that Institution, neither species being in the collection of either the United States National Museum or the American Museum of Natural History. Both species are before me and since they are obviously congeneric, it makes no difference, for our purposes, which is eventually decided on as the genotype. Dr. Hinton has kindly permitted me to keep one specimen of each species, so that they are available to anyone in this country who may wish to check the present work.

Microlipus Leconte (15). "Antennae 11-jointed, elongate, subserrate. Maxillary palpi short, thick, the fourth joint conical. Labrum quadrate, with the apex subrotund. Clypeus short, membranous. Anterior tarsi with the fourth joint slightly lobed beneath" (translation from the Latin).

"The body is elongate and linear, the head as broad as the thorax, very much narrowed in front of the eyes, which are prominent; the tip of the elytra is simple in both sexes; the head of the male is slightly trifoveate; the ventral segments of the abdomen are entirely corneous."

The genotype is *laticeps* Lec., by monotypy.

Hapalorhinus Leconte (16). "Antennae frontal, inserted in rather large foveae, 11-jointed, pectinate or serrate; maxillary palpi with the last joint elongate-acuminate; labrum transverse, truncate; clypeus short, membranous; anterior tarsi 5-jointed, those of the male not dilated; abdomen with the segments entirely corneous or membranous in the center; head short" (translation from the Latin).

"A genus also intermediate between *Malachius* and *Anthocomus*, agreeing with the first in the position of the antennae, with the second by the membranous clypeus."

The genotype is *mirandus* Lec., by present designation. Leconte states: "besides the species here described, I refer to this genus *Malachius auritus* Lec."

The following comparative notes on *Anthocomus fasciatus* and *sanguinolentus*, together with our North American species of the genus, are here recorded, as pertinent to the present investigation.

A. fasciatus Linn. 1 male, 2 females; length 3.5 to 4 mm. Of the same shape and habitus as *A. erichsoni* Lec. The male elytra are appendiculate, being of the same general type as *erichsoni*, i.e., the elytra apices are split horizontally, the lower lamina apparently softer and thicker than the upper and extending beyond it caudally. The proximal one-half, or slightly less, of the clypeus or epistoma is corneous, the distal half membranous, in both sexes. The frontoclypeal suture in the male is clearly marked and bisinuate; in the female it is subobsolete and straight. In both sexes, the anterior borders of the antennal foveae are practically tangential to this suture and the outer borders are almost in contact with the upper end of the mandibular articulations. A line tangential to the upper edges of the foveae just touches the anterior border of the eyes. A comparison of these specimens with Erichson's definition of the

genus shows them to be in complete agreement with the latter, except as regards the clypeus or epistoma, which he states is membranous. If either *fasciatus* or *sanguinolentus* be considered as the genotype, the explanation of this discrepancy is not clear, since he would not have made the statement that the antennae are inserted exactly ("unmittelbar") at the anterior border of the head if he had mistaken the membranous portion of the clypeus for the entire structure. Three specimens of each species are quite insufficient to determine the extent of variation in the relative proportions of the corneous and membranous portions of the clypeus and it is possible that his definition of the genus was drawn from a specimen in which this structure was almost or entirely membranous. Horn (7) in 1872, made the following statement: "As Duval observed, very little reliance can be placed on characters drawn from the extent of the coriaceous margin of the front, or from similar structure in the ventral segments", in the Malachiidae. My own observations along this line, already recorded (1), lead me to agree thoroughly with this statement and, since these observations were published, I found that Blaisdell (17) discussed the same question in the closely related Melyridae and arrived at similar conclusions. I believe, therefore, that we need not be too concerned over this discrepancy between the generic description and the genotype.

A. sanguinolentus Fab. 3 females; length 4.5 to 7 mm. Of the same habitus as *fasciatus*. The antennal foveae have the same relation to the fixed points mentioned above in the case of *fasciatus*, except that they are placed slightly farther forward with relation to the eyes, due to the slightly more elongate frontal portion of the head in *sanguinolentus*. Only about one-third of the clypeus is corneous and in one specimen the left antennal fovea extends well down into the corneous portion of the clypeus. The other characters agree with those mentioned in the generic description, as in *fasciatus*. The labial palpi and ligula in both this species and *fasciatus* cannot be clearly seen, due to the manner in which they are mounted, but in *erichsoni* they agree with the generic description.

A. erichsoni Lec. is of the same general habitus as the preceding species, although the males are somewhat more parallel than the male of *fasciatus*. The clypeal suture is distinct, slightly arcuate posteriorly and the corneous portion extends from one-third to one-half the distance from the frons to the labrum, this variation occurring at times in the same individual, i.e., the line of demarca-

tion between the corneous and membranous portions being oblique. The position of the antennal foveae, with relation to the fixed points mentioned above, is identical with that of the foveae in the genotype. In the males, the clypeus and labrum are both shortened and the former is entirely corneous, but this is not of generic significance. The males have the antennae mildly serrate, the females scarcely so, as in the genotype. It is of interest to note that one European species, *cardiacae*, has the antennae pectinate in the male.

The characters of generic significance in *flavilabris* Say and in the recently introduced *bipunctatus* Harrer are the same as those in *erichsoni* and it is concluded that there is no reason to question the correct placement of these species in the genus *Anthocomus*.

As to the third species of *Anthocomus* in our lists, *ventralis* Horn, I assume that it was correctly placed in that genus by the author. My collection contains two specimens which were formerly placed under that name, one sent me so named by Mr. F. W. Nunenmacher and one, so identified, obtained from the American Museum of Natural History. On closer examination the former proved to be a male of *Attalus foveiventris* Fall and the latter a male of *Tanaops mimus* Fall. Little help was obtained from studying the series of seven specimens placed under this name in the collection of the United States National Museum, four of which belong to a species of *Attalus*, one is a female *Tanaops* and the remaining two are females of another species, possibly an *Anthocomus*, possibly not. A final effort was made to properly identify this species by an examination of Horn's type, in the Academy of Natural Sciences of Philadelphia, but it was found that the type is missing from the collection of Horn types in that Institution.

On comparing Fabricius' description of *Malachius* with the type species, *aeneus* Linn., it is found that the characters in the genotype agree with the very brief description. The description could apply equally well to the species of *Anthocomus*, *Microlipus* and the North American species of *Malachius*; but I believe that sufficient evidence has been presented to show that the latter group of species does not belong in the same genus with the genotype of *Malachius*. There are now before me two additional European species of *Malachius*, *bipustulatus* Linn. and *coccineus* Waltl. These agree with the genotype, and disagree with our species, in the position of the antennal foveae, the entirely corneous clypeus, the presence of clypeal or frontal ridges or prominences in the male, a character wholly wanting in any of our species, and in the absence of any sexual modification of the elytral apices.

The genotype of *Microlipus*, *laticeps* Lec., agrees with Leconte's description of the genus, except that the antennae are subserrate only in the male, the clypeus is not entirely membranous and, so far as I am able to determine, the fourth joint of the male protarsi is not lobed beneath. It appears that, with the exception of the 11-jointed antennae and the maxillary palpi, Leconte's definition of the genus contains characters of specific value only and that it applies equally well to all our smaller and narrower species now assigned to *Malachius*. Fall (6) discussed and effectively disposed of the other characters which Horn had advanced to distinguish the two groups of species; namely, the feebly serrate antennae, the slender form, the stouter front tarsi of the male and the apterous condition of the female in two of the species. He considered the two groups of species to be congeneric, but was inclined to transfer the species of *Microlipus* to *Malachius*, a procedure which, in view of the present evidence, appears to be inadmissible.

Finally, if we exclude the characters which have been shown to possess only specific value, and compare the generic characters of *Microlipus* and *Anthocomus*, according to the original descriptions, we find that there are none which do not apply equally well to either genus and a comparison of specimens of *Anthocomus erichsoni* with those belonging to species of the other two groups fails to disclose, in my opinion, any differences which would justify their generic separation. The characters which Horn (7) gives in his 1872 key are precisely those which Fall (6) discussed and set aside, in 1917, as being either nonexistent or having no significance of generic value. Horn's statement that the "elytra are similar in the sexes" in *Anthocomus* is an error, even as applied to our small number of species then assigned to the genus and is contradicted by himself later in the same paper (p. 117).

Since we have decided that our species of *Anthocomus* are properly placed in that genus and that there are no generic differences between it and the other two groups of species which we have been discussing, the only course which is open is to place these two groups in the genus *Anthocomus*, which has a twelve year priority over *Microlipus*. *Microlipus* is thus suppressed, as a synonym of *Anthocomus*. *Malachius* must remain in our lists for the single introduced species, *aeneus* Linn.

Hapalorhinus was suppressed by Horn (7) in 1872, as a synonym of *Malachius*. Under the present arrangement, it becomes a synonym of *Anthocomus*, since its genotype, *mirandus* Lec., is being

transferred to that genus. Leconte's short description of *Hapalorhinus* does not mention any generic characters which are in any wise different from those of *Anthocomus*. The clypeal suture is unusually indistinct in *mirandus*, in some specimens almost obsolete, which may be the explanation of Leconte's statement that it agrees with *Malachius* in the position of the antennae; and the length of both the corneous portion of the clypeus and of the labrum is quite variable. In no specimens that I have examined is the clypeus entirely membranous.

In 1925 Hopping (4) redescribed *Attalus nigrellus* Lec., as *Microlipus falli*. In placing the species in *Microlipus* he was undoubtedly influenced by its pectinate antennae and its narrow, elongate form, characters in which it differs radically from all other North American species of *Attalus*. Mr. J. W. Green, who is an indefatigable and a very accurate observer, has recently called my attention to a character which separates the genera of Malachiidae into two almost equal groups. In the first of these, which includes *Endeodes*, *Malachius*, *Microlipus* and *Anthocomus*, the lateral margin of the prothorax is acute and well defined in the basal half or less; in the other group, which includes *Collops*, *Temnosophus*, *Pseudebaeus*, *Tanaops* and *Attalus*, the acute lateral margin is not interrupted, but continues around the anterior angles to join the equally acute anterior margin. The only exceptions to this character that have been noted, by either Mr. Green or by myself, are in two species of *Attalus*, *A. nigrellus* Lec., and a species which is to be described in the present paper as *Attalus texanus*. It is believed that the three characters mentioned, i.e., the pectinate male antennae, the linear form and the interrupted thoracic margin, justify the removal of *nigrellus* from *Attalus* and its return to *Acletus* Leconte, which genus was erected by Leconte (15) for this particular species. I do not find that the first protarsal joint in the males of *nigrellus* is "inferior and almost indistinct," as Leconte states, but do find that it further differs from normal *Attalus* in having the lobe of the second joint much shorter, being only about half the length of the third joint. In addition to the interruption of the acute thoracic edge, the lateral margin, viewed horizontally, is seen to be angulated ventrally at about the middle, while in *Attalus* the lateral margin is either in the same horizontal plane throughout or has a smooth curve, with the convexity ventral.

The last change which I wish to make in the generic arrangement is the addition of *Attalusinus* to the key. Bradley (18), in

his "Manual of Genera," did not include this genus in his key, for the obvious reason that Leng (19), who established the genus in 1918, for *Ebaeus submarginatus* Lec., gave no description of it, merely stating that *submarginatus* "represents a new genus, nearer to *Chaetocoelus* than to *Attalus*." Since the name was proposed in connection with a definite species, however, it will have to stand, description or no description (20). I have examined the species in the U. S. National Museum and made the following notes, which suffice for its placement in the key. Antennae 11-jointed, slightly serrate in the male, filiform in the female; tarsi of male all 5-jointed, the second protarsal joint projecting in a lobe over the third; elytra covering three-fourths of the abdomen in the male, one-fourth in the female, the inner margins straight and in contact almost to the tips of the elytra, which are squarely truncate in the male, obliquely truncate in the female. Antennae inserted at the front margin of the front and far to the side, as in *Anthocomus*. Thorax narrowed behind; abdomen without bristles. The genus is doubtfully distinct from *Endeodes*, but the single species, *submarginatus* Lec., can be easily separated from the known species of *Endeodes* by its small size and by the fact that in *Endeodes* the elytra are much shorter and separate much before reaching the tips, which are separately rounded.

Previous keys to the genera of Malachiidae are those of Horn (7), Leconte and Horn (21), and Bradley (18). The two latter are merely copies of Horn's key, even to the misstatement that the elytra are similar in the sexes in *Anthocomus*, but with the addition of *Chaetocoelus*. The key here presented likewise follows that of Horn, with such changes as are made necessary by the above discussion. I have had several requests for a key which does not depend upon sexual characters, but have not been able to construct one which I think would be of any value. Possibly Mr. Green's observation as to the lateral thoracic margin might serve as the starting point of such a key.

KEY TO THE GENERA

1. Antennae apparently 10-jointed; the second joint atrophic and very minute *Collops*
Antennae distinctly 11-jointed 2
2. Male protarsi 4-jointed 3
Anterior tarsi 5-jointed in both sexes 4
3. Head long; first joint of antennae cylindrical *Trophimus*

- Head short; first joint of antennae with a recurrent process. *Temnosophus*
4. Elytra abbreviated 5
 Elytra covering the abdomen or nearly so 7
5. Abdomen with long bristles *Chaetocoelus*
 Abdomen without bristles 6
6. Size not over 2 mm. Sutural margins of elytra in contact almost to the tips *Attalusinus*
 Size 3 mm. or more. Sutural margins of elytra diverging from near the base *Endeodes*
7. Antennae inserted on the front, the antennal foveae distant from the clypeal suture by almost or quite the diameter of a fovea 8
 Antennae inserted at the front margin of the front, near the sides and contiguous to the clypeal suture 9
8. Male protarsi unmodified. Head short. One introduced species *Malachius*
 Second joint of male protarsi slightly covering the third. Head usually elongate. Male with ventral abdominal pits. *Tanaops*
9. Male protarsi unmodified 10
 Male protarsi with the second joint prolonged in a lobe over the third 11
10. Elytral tips of male prolonged and with a small cup-shaped process extending upward from the tip of each elytron. *Pseudebaeus*
 Male elytra modified or not; if so, the tips are split horizontally, with a variously shaped process below the plane of the elytra *Anthocomus*
11. Form elongate; male antennae pectinate *Acletus*
 Form relatively broad; antennae never more than moderately serrate *Attalus*

Collops Erichson

Shortly before his death, Mr. F. W. Nunenmacher sent me two species of this genus, supposedly described by Mr. Fall, under names which could not be found in the literature. Dr. Darlington informs me that no such names appear in the Fall collection, in the Museum of Comparative Zoology. Presumably they are manuscript names, but the further study and description of the species, if they prove to be undescribed, will have to await a future number of these studies.

One all-yellow male specimen, with the head and pronotum brownish, from Palm Springs, California, apparently represents a new species, but will not be described at the present time, due to the possibility that the very unusual color, for the genus, is due to bleaching of the specimen by chemicals. It is mentioned here in the hope that other similar specimens from the same locality may be discovered and sent to the author for study.

Trophimus Horn

Three specimens of *aeneipennis* Horn, in the collection of Mr. J. W. Green, from the Davis Mts. and San Saba, both in Texas, extend the known range of this species, hitherto reported only from Colorado. I have also seen specimens from New Mexico, although I am unable to give the exact locality at the present time.

Temnosophus Horn

One female of *impressus* Schwarz, in Mr. Green's collection, from Ocean City, New Jersey, and two females from the same locality, in the American Museum of Natural History, provide an interesting extension of geographic range for this species, hitherto recorded only from Florida.

Attalusinus Leng

The single species, *submarginatus* Leconte, known for many years from the unique female type, which was recorded as from the "Colorado River, California," was subsequently rediscovered by Dr. Schwarz at "Catalina Springs, Arizona," and a series of five specimens taken. It is from this series, located in the U. S. National Museum, that the above structural notes were taken. Mr. H. S. Barber informs me that Catalina Springs is an old name for a locality in the foothills of the Santa Catalina Mts., just north of Tucson, Arizona, and near the mouth of Sabino Canyon. Dr. Schwarz' notes show that the specimens were taken by digging around the roots of a Composite plant, *Riddellia* sp., in April, 1898. It is to be hoped that collectors in this region will make a special effort to secure additional specimens of this rare and interesting species, which is probably common enough if looked for at the proper place and time. The epigeal habits of the species are a further indication of its relationship to *Endeodes*. The U. S. National Museum collection also contains one male specimen from the Panimint Valley, California, and two males from Sabinas Hidalgo, Nuevo Leon, Mex-

ico, which Mr. Barber does not regard as conspecific with the Arizona specimens. He states that "such a distribution, straddling the continental divide, and in a genus in which the females at least are flightless must indicate existence of numerous species, of which I think three are before me and I believe none of them is *submarginatus* Lec." The further study and possible description of such of these species as may be new will have to await the opportunity to examine Leconte's unique type.

Chaetocoelus Leconte

A single female specimen, in the U. S. National Museum collection, labeled "*Chaetocoelus* n. sp." upon examination does not appear to be specifically distinct from the only presently known species of the genus, *setosus* Lec., although it is somewhat larger than any other of the dozen or more specimens present. The species is rare in collections; it was originally recorded as found "in the densest recesses of the forest, on grape vines."

Malachius Fabricius

The only species of this genus remaining in our lists, the introduced *aeneus* Linn., recorded from Eastern Canada, New England and New York, has now obviously spread entirely across the continent, in the region of the Canadian border, as I have numerous specimens collected in British Columbia.

Observation of a dozen or so European species of *Malachius* in the U. S. National Museum collection indicates that some revisional work is desirable in that group of species, but I am content to confine my efforts, for the present, to the North American species of the family.

Tanaops Leconte

It is gratifying to learn, from Dr. E. C. Van Dyke, that with the assistance of the key which I offered in the first number of these studies (1), he was able to identify all the material in this genus in the collection of the California Academy of Sciences, which probably contains the richest material in the genus of any collection in the Country. Further, all of the species there mentioned, except *testaceus* Marshall, were found in that collection. Dr. Van Dyke has also added to the geographic distribution of two of the recently described species (1), as follows: *T. oregonensis* Marshall, from Humboldt Co., California, and *T. nunenmacheri* Marshall, from "several localities in Mono and Inyo Cos., California."

T. basalis Brown. A series of five specimens, collected by Mr. Joe Schuh at different points in Oregon—Redmond, Albert Lake and Prineville—appear to be identical with the darkest colored individuals from British Columbia (1). In one of these, a female, the testaceous spot at the posterior thoracic angles, characteristic of typical specimens, is present and the entire lateral and posterior thoracic margins are narrowly pale, whereas the thorax in all the others is completely black. These specimens not only extend the known range of the species, but indicate that the species is more darkly colored in the southern portion of its range.

Anthocomus Erichson

Malachius Fabricius (in part).

Microlipus Leconte.

Hapalorhinus Leconte.

KEY TO THE NORTH AMERICAN SPECIES

1. Both sexes winged; elytra more or less parallel 2
Females apterous; the elytra strongly inflated posteriorly ... 35
2. Antennae serrate in the male 3
Antennae pectinate in the male 20
3. Elytra not appendiculate in the male 4
Elytra appendiculate in the male 11
4. Prothorax smooth and shining 5
Prothorax punctulate and more or less alutaceous 8
5. Prothorax with hind angles pale; elytra vittate in male.
floricola (Martin)
Prothorax unicolorous; elytra not vittate in male 6
6. Elytra unicolorous, metallic green or blue-green.
viridulus (Fall)
Elytra not unicolorous 7
7. Elytra bluish-green; apex tinged with yellow; male only known.
laevicollis (Horn)
Elytra metallic blue, with yellow spot at sutural angles in both
sexes *biguttulus* (Horn)
8. Antennae of male as long as body; prothorax pale with small
dorsal cloud *productus* (Fall)
Antennae of male not over three-fourths as long as body; pro-
notum with broad dorsal dark stripe or with margins alone
narrowly pale 9
9. Prothorax distinctly wider than long, sides broadly pale.
aequalis (Fall)
Prothorax about as long as wide, margins narrowly pale 10

10. Elytra distinctly inflated posteriorly in female; head scarcely wider in male than prothorax, the pale side margins of the latter very narrow, sometimes vestigial.

franciscanus (Fall)

Elytra not or very slightly inflated posteriorly in female; head in male evidently wider than prothorax, the pale lateral margins of the latter better developed, especially at the front angles *laticeps* (Lec.)

11. Tips of elytra spiniform in the male, the appendix not visible from above *acutipennis* (Fall)

Tips of elytra not spiniform in the male, the appendix visible from above 12

12. Thorax entirely reddish yellow; abdomen yellow.

ventralis Horn

Thorax not entirely yellow 13

13. Thorax with sides more or less broadly reddish yellow 14

Thorax entirely dark or with hind angles alone yellow 16

14. Elytra entirely dark in both sexes; pale thoracic margins broad.

erichsoni Lec.

Elytra with tips reddish in the female 15

15. Thorax with numerous erect hairs; elytral spine of male reddish at base and not sinuate or notched on outer side; ventral plate of elytral appendix relatively simple.

auritus (Lec.)

Thorax without erect hairs; elytral spine of male grayish at base and with a deep sinuation or notch at its outer side; ventral plate of elytral appendix contorted and deeply emarginate *contortus* (Fall)

16. Elytra yellow, with a variably sized dark spot on each, just behind the middle *bipunctatus* Harrer

Elytra either entirely dark or with sutural tips alone yellow 17

17. Sutural tips yellow, elytra dull black, size 2.5 mm.

pristinus (Fall)

Elytra entirely dark 18

18. Male antennae feebly serrate; color piceous, faintly bronzed; epistoma yellow; size 3-4 mm. Eastern ... *flavilabris* (Say)

Male antennae strongly serrate 19

19. Color dark blue-green; elytral appendix normal in type for the genus; size 4-5 mm. So. California *falli*, new name

Color bluish-black; elytral appendix abnormal, with the lower

plate produced in a curved process, consisting of a central "horn" and two lateral "flaps," that extend well above the level of the elytra. Size 4.2 mm. Utah

utahensis (Tanner)

20. Elytra appendiculate in the male 21
- Elytra not appendiculate in the male 27
21. Appendices not visible from above 22
- Appendices visible from above 23
22. Pectinations on antennal segments 6 and 7 longer than the segments and constricted in the center
- antennatus* (Hopping)
- Pectinations on segments 6 and 7 shorter than the segments and not constricted *horni* (Fall)
23. Elytra of male either entirely yellow or yellow tipped with pale rufous; appendix slender *mirandus* (Lec.)
- Elytra of male either entirely dark or dark with pale tips ... 24
24. Elytral appendix of male broad, rounded at tips, without an accessory process parallel to inner margin of each; size 3.5 mm. *directus* (Fall)
- Elytral appendix with accessory process; size 4 mm. or more 25
25. Elytra of male entirely blue, without pale tips.
- theveneti* (Horn)
- Elytra of male black, slightly aeneous; tips pale 26
26. Elytral appendix long and narrow, projecting well beyond the elytral tip. California *bakeri* (Fall)
- Elytral appendix broad and rounded, scarcely visible beyond the elytral tip. Colorado *rotgeri* (Marshall)
27. Prothorax longer than wide; male antennae fully as long as the body *prolixicornis* (Fall)
- Prothorax wider than long; male antennae shorter than the body 28
28. Elytra with a broad yellow vitta on each 29
- Elytra not vittate 30
29. Elytra vittate in both sexes, antennal pectinations shorter.
- macer* (Horn)
- Elytra vittate in male, tipped with yellow in female; pectinations longer *yuccae* (Hopping)
30. Elytra tipped with yellow in both sexes 31
- Elytra entirely dark in both sexes 33

31. Pectinations on antennal segments 7 and 8 twice as long as the segments; elytra black with slight greenish luster.
montanus (Lec.)
 Pectinations on segments 7 and 8 about as long as the segments; elytra bluish in color 32
32. Pronotum black with broad lateral margins reddish and a black subbasal spot in each margin. Size 3 mm.
blaisdelli (Hopping)
 Pronotum black, with the basal angles and rarely the basal and lateral margins narrowly red; no marginal spots; size 3.5 to 4.5 mm. *mixtus* (Horn)
33. Sides of thorax broadly reddish yellow *ulkei* (Horn)
 Thorax entirely dark 34
34. Color black without metallic luster; form slender; size 3 mm.
nigrinus (Fall)
 Color metallic blue; form broader; size 3.5 to 4 mm.
californicus (Barrett)
35. Pronotum with sides broadly reddish *longicollis* (Mots.)
 Pronotum entirely dark or with basal angles alone pale 36
36. Pronotum with basal angles yellow *moerens* (Lec.)
 Pronotum entirely dark *moerens* var. *uniformis* (Mots.)

Of the 37 species treated in the above key, 26 are before me. The characters used in the key for the remaining species, which are *floricola*, *laevicollis*, *productus*, *aequalis*, *ventralis*, *pristinus*, *falli*, *utahensis*, *bakeri*, *prolixicornis* and *blaisdelli*, have been taken from the original descriptions of these species.

A. ventralis Horn. An unsuccessful effort was made to obtain information concerning the two type specimens or cotypes of this species, which were finally found to be located in the Carnegie Museum in Pittsburgh, that would resolve the doubts as to its identity expressed in the introductory portion of this paper. This is one of the intriguing problems that must await further investigation and the opportunity to personally examine the type specimens.

A. bipunctatus Harrer. This European species was first recorded from North America by French (22) in 1943, according to information furnished me by Mr. H. S. Barber, and again mentioned by the same author (23) in 1944. Mr. Barber states that it is now common in the houses around Washington, D. C. and I have specimens collected by Mr. J. W. Green at Easton, Pennsylvania, on IV-16-46 and identified by Mr. Barber.

A. flavilabris (Say). A statement that I made in 1946 (1) concerning this species requires correction. I stated then that "my single male of *flavilabris* does not have the elytral tips modified." The statement was an error, as the specimen in question was a male of *Attalus pallifrons* Mots., so mounted that the anterior tarsi were not visible. A short series from New Hampshire, which I believe to be the true *flavilabris*, contains one male, in which the elytral apices are modified as in *erichsoni*. Mr. Brown was probably correct in assuming that his specimens were *flavilabris*.

A. utahensis (Tanner). Assuming that the figures of the elytral appendices given by Professor Tanner with his description are typical of the species and not some unusual distortion produced in the process of drying in the unique type, I am inclined to believe that the species represents a new genus, as the appendages are quite unlike anything known to me in the family, including *horni* and *auritus*, which he mentions as being "nearest to those found in *utahensis*."

A. horni (Fall). It has been suggested that Horn's original name for this species, *spiniformis*, be restored, if the species is to be removed from the genus *Malachius*, in which it was described. I do not believe that this action would be permissible, since *spiniformis* was a homonym, rather than a synonym and, according to Article 36 of the International Rules "rejected homonyms can never be used again."

A. mixtus (Horn). The examination of a series of 54 specimens of this species, collected by Mr. Joe Schuh at various points in Oregon, and about equally divided between the sexes, forces me to make a correction in my recent reference to the species (1). A reexamination of the females there referred to, from Chelan, Washington, as well as those identified as *mixtus* by Mr. Nunenmacher, shows that they should be placed under *horni* (Fall). *Mixtus* resembles *biguttulus* rather closely, but the male antennae are definitely pectinate. In some of the females the yellow apical spots are markedly reduced in size and in several these spots are altogether absent. The elytral apices of the males are thickened and roughened and most specimens show a rather large pit near the center of each yellow spot. In those specimens with the most pronounced pits, the latter become transverse, with an obvious tendency toward the lamination of the elytral apices seen in those species with fully developed appendiculate elytra. The species thus serves as a connecting link between the two groups with and without elytral ap-

pendiculation and makes the placing of these two groups in the same genus less incongruous than it would otherwise appear.

A. ulkei (Horn). A male from Baskerville Pk., Wisconsin, so determined by Mr. J. W. Green, and in which I concur, extends the range of this rare species, otherwise recorded, so far as known to me, only from "Dakota."

A. uniformis (Mots.). There has been considerable speculation as to the proper position of this form and especially as to its relation to *moerens* (Lec.). Horn (7), in 1872, placed the species as "possibly" a synonym of *Microlipus laticeps* Lec. Fall (6), in 1917 considered it as a synonym of *moerens* (Lec.), although his single specimen of *uniformis* came from a different locality than the other six specimens in his series of *moerens*. In 1944 Brown (3) expressed the opinion that *moerens* and *uniformis* were "specifically or subspecifically distinct," basing his opinion on a series of nine females of *uniformis* from British Columbia, whereas all of his specimens of *moerens* were, apparently, from the "San Francisco region." In 1946 the present author (1) expressed the same opinion as Mr. Brown's, basing his conclusion on similar evidence, i.e., a series of 5 males of *uniformis* from Forest Grove, Oregon. The recent acquisition of additional material, consisting of seven males from Forest Grove and Cornelius, Oregon, all of them *uniformis* and five females from Waldport, Oregon, all of them *moerens*, seemed to effectually dispose of the idea of one being a geographic race of the other and, had it not been for Brown's record of 9 females of *uniformis*, would have led to the conclusion that *uniformis* was the male and *moerens* the female of the same species.

The following notes, kindly furnished me by Dr. E. C. Van Dyke, from a study of the material in the collection of the California Academy of Sciences, throw much additional light on the question. "I find that we have small series of both typical *moerens* and what I am inclined to consider the variety *uniformis* Mots. The latter, of which we have 47 specimens, are from San Francisco, Fort Baker, Marin Co., Salada Beach, San Mateo Co., Newark, Alameda Co., and the Berkeley Bay shore, all localities either close to the ocean or bay. It seems to me that they frequent the salt grass areas, near salt water. Our specimens of *moerens*, 19 in number, are from Carmel and Pacific Grove, Monterey Co., Larkspur, Marin Co., and Korbelt, Humboldt Co. The red spots at the base of the pronotum vary in size, are most pronounced in several of the Larkspur specimens, though much reduced in one. In our Salada Beach

uniformis, our most numerous examples are quite typical, though a few show faint traces of yellow at the base of the prothorax. In many places along the California coast, in what I call the maritime zone, there is a tendency toward melanism. We see it in *Silis* (Cantharidae), in many *Elaters*, etc. I believe that *moerens* is likewise influenced by the humidity, and that *uniformis* is but a wet belt phase or variety."

As the evidence now stands, thanks to the observations of Dr. Van Dyke, I believe that *uniformis* should be placed as a color variety of *moerens*.

Acletus Leconte

This genus is restored, in the above key to the genera, for the species now known as *Attalus nigrellus* (Lec.), which Horn (7) transferred from *Acletus* to *Attalus* in 1872. I agree with Leconte that it is generically distinct, for the reasons given above, from the other species of *Attalus*, those which were known to Leconte at the time that he described *nigrellus* (15), being placed by him in the genus *Anthocomus*.

Attalus Erichson

A revision of this genus, long overdue, will be my concern in the next number of these Studies. At the present time I wish merely to offer the description of a few new species that have come to my attention recently, most of which center around *morulus* (Lec.).

A. morulus (Lec.). A great deal of time and energy have been expended in the effort to correctly identify this species, not only by myself, but also by Mr. J. W. Green, who furnished me with numerous specimens of two similar species, from Pennsylvania and adjoining states, both of which correspond to Leconte's short description of *morulus* (15), and by Mr. C. A. Frost and Dr. P. J. Darlington, who on two separate occasions carefully examined Leconte's type series of *morulus* in the Museum of Comparative Zoology at my request, the last time with the benefit of a pair, male and female, of each of the two species, carefully selected to show the distinguishing characters. These two species, which during months of correspondence were referred to as *morulus* I and II, together with *A. smithi* Hopping and a related form from Colorado, form a group of species which have for many years been confused in the best collections in the Country.

The type series of *morulus* contains ten specimens, the first of which, bearing a green disc which means "Neb., etc.," the name "*Ebaeus morulus* Lec.," in Leconte's handwriting and a red label designation "Type 3481," is taken as the holotype. According to Mr. Frost and Dr. Darlington, it is a female of "*morulus* I." Specimens 2 to 7 of the series, inclusive, evidently belong to "*morulus* II," to be described presently as *Attalus greeni*, according to detailed information from Mr. Frost. Specimens 8, 9 and 10, all from Garland, Colorado, are not so easy to place accurately from the information at hand. They apparently belong to either *A. greeni* or to a variant of *A. smithi* Hopping, to be presently described as *Attalus coloradensis*. The type series obviously does not contain a specimen of the male which corresponds with the unique female type and the selection and description of the male allotype is therefore indicated. A similar mixing of *morulus* and *greeni* was noted in the collections of both the U. S. National Museum and the Academy of Natural Sciences of Philadelphia, with *greeni* predominating in both collections.

The following key will enable the four forms mentioned to be easily separated. They all run to *morulus* (Lec.) in Horn's 1872 key.

1. Females with a deep, narrow notch at the apex of the last sternite, the surface of which is convex; head black, with only the membranous portion of the clypeus pale. Males with the last tergite parabolic in form, with a small semi-circular notch at the apex; head black, with the entire clypeus and a trilobed frontal area yellow 2

Females with the last sternite concave and unmodified at the apex; males with the last tergite triangular in form and widely emarginate at the apex. Head similarly colored in the sexes; black, with the entire clypeus pale ... *greeni* n.sp.

2. Apical notch in the female deep, extending from slightly more than one-half to almost the entire length of the segment, the surface of which is more convex, less shining, more densely and coarsely pubescent. Notch at apex of last tergite in male plainly visible with low magnification. All the legs piceous-black in the female, the anterior one or two pairs slightly paler in the male *morulus* (Lec.)

Apical notch in the female smaller, from one-sixth to slightly less than one-half the length of the segment, the surface of which is less convex, more shining, more sparsely and

- finely pubescent. Notch at apex of last tergite in male extremely minute. Color of legs variable. Western 3
3. All the legs in both sexes testaceous, except the hind femora, which are mostly piceous. The trilobed frontal area of the males prominent and constant *smithi* Hopping
- Legs colored as in *morulus*, except that the anterior one or two pairs are often paler in the females, as well as in the males; the trilobed frontal area of the males usually reduced or, rarely, absent *coloradensis* n. subsp.

A. morulus (Leconte). *Male*. Elongate, slightly widened behind, upper surface black, feebly shining, with a sooty luster. *Head* black, the clypeus and a trilobed frontal area, the triangular lobes of which reach to the level of the middle of the eyes, testaceous; labrum piceo-testaceous; all the mouth-parts anterior to the base of the mentum and the genae testaceous, the tips of the mandibles, the last joint of all the palpi and the gula piceous-black; short, broad, eyes prominent, definitely wider than the thorax across the eyes; surface more shining than that of thorax and elytra, sparsely and minutely punctured and with sparse, fine, pale pubescence; a transverse row of black setae on the clypeus just anterior to the clypeal suture. *Antennae* feebly serrate, strongly pubescent, piceo-testaceous, darker toward the tips, the basal three joints testaceous, with a piceous spot on the dorsal surface of each; long, reaching almost to the middle of the elytra. *Prothorax* transversely oval, slightly narrowed behind, one-fifth wider than long, surface more finely punctate and pubescent than the elytra. *Elytra* black at the base, becoming slightly piceous in the apical three-fourths; surface slightly rugose, rather densely and finely punctured and with fairly dense, short, semi-decumbent brown pubescence, a few erect black hairs along the lateral margins. Elytral tips separately rounded, the pygidium and a portion of the penultimate tergite exposed. Pygidium piceous, parabolic, shining, with a small semi-circular notch at the apex and a lateral sulcus on each side, slightly nearer the margin than to the midline and not reaching the posterior border, the margin beset with numerous stiff, bristly hairs. The apical portion of the pygidium is reflexed and the apical notch becomes a groove on the under surface, opening into the genital aperture. *Under surface* piceous; prosternum, mesosternum, mesosternal epimera and narrow margins of the abdominal segments testaceous. The last sternite is formed of two lateral lobes, the antero-median portion of each being membranous and pale and the

tips separately rounded, leaving a crescentic aperture between them and the reflexed portion of the pygidium. The *legs* are tricolored, the anterior pair testaceous, the middle piceo-testaceous, and the posterior piceous. The tarsi are all darker than the tibiae and the coxae and trochanters lighter than the femora. Each of the anterior two pairs of femora has a narrow piceous stripe along its dorsal edge. The lobe of the second protarsal joint is long, reaching the end of the third joint and broadened toward the tip, which is rounded, with the edge black. Length 2 mm. to tips of elytra.

Allotype, male, "Linwood, New Jersey, VII-17-44." Described from a series of 20 males (including the *parallotypes*), accompanied by a slightly larger number of females, collected by Mr. J. W. Green at Linwood and Atison, New Jersey, Wind Gap and Mt. Pocono, Pennsylvania, Up. Saranac, New York, and Black Mt., North Carolina. Allotype and *parallotypes* in the author's collection. *Parallotypes* also in collections of Mr. Green and Mr. C. A. Frost.

The *parallotypes* do not show much variation of importance. The length varies from 2.0 to 2.5 mm. (female from 2.0 to 3.0 mm.). In only one specimen is the trilobed frontal area definitely reduced, the central lobe of the area being narrowed and the sides rendered parallel, instead of diverging anteriorly, by a broadening of the black wedges extending between this and the narrower lateral lobes. In most of the specimens the legs are darker than in the type, the middle pair being piceous and the anterior piceo-testaceous. In a few the legs are uniformly piceous, as in the female. The two lobes which compose the last sternite are piceous or piceous-black in their corneous portions in all specimens except the type (in which these lobes are piceous in their central portions, with testaceous margins), leaving a transverse, membranous, conspicuous, diamond-shaped area, composed of the contiguous parts of the last two sternites. The *adeagus*, as usual in the family, is composed of a long cylindrical sheath, from which projects the thin, sharp, bristle-like penis. The whole apparatus, when extended, is about the length of the abdomen and must be telescoped when not in use. When fully extended, as in one specimen, a second bristle-like organ projects from the sheath, ventrad of the penis and immediately turns cephalad, to form a sharp hook.

This particular form of retaining apparatus, which is its obvious function, has not been noted in any other member of the family. The groove or slot in the end of the pygidium obviously serves as a director for the long, slender penis, which, in one specimen, is observed resting in this groove, in which it appears to fit perfectly.

A. smithi Hopping. While closely related to *morulus*, I am in agreement with Prof. Fall, who examined Hopping's specimens, that the two species are distinct. The characteristic differences in the genital segments, as given in the above key, are constant and easily observed. Curiously enough, since the sexes are so easily separated by the male protarsal structure, Hopping appears to have confused the sexes when he stated: "Male: Tip of last abdominal segment deeply, narrowly emarginate. Female: Tip of last abdominal segment rounded"; and again: "Five females out of a series of 24 have the apical part of the head, as well as the mouth-parts, testaceous." In the series of two males and six females before me, obtained from Mr. G. Stace Smith, these characters are the same as in *morulus* and the exact opposite of what is stated by Hopping (4).

A. smithi coloradensis, new subspecies. Resembles *smithi* in all respects except that of color.

Male. Size and shape of *morulus* and *smithi*. Color of prothorax and elytra same, black, the elytra with a sooty luster and more numerous erect black hairs along the elytral margins than usually observed in *smithi*. *Head* entirely black, except the membranous portion of the clypeus, the base of the mandibles, lower portion of the genae and ventral surface of the first three or four antennal joints, which are testaceous. *Under surface* piceous, the anterior edge of the prosternum, mesosternal epimera, anterior trochanters and posterior edge of the ventral segments, testaceous. *Legs* piceous throughout, except the ventral surface of the anterior tibiae and tips of the anterior femora, which are piceo-testaceous. Notch at tip of pygidium very minute, as in *smithi*.

Female. Similar to male in coloration and vestiture of prothorax and elytra. *Head* entirely black, except that those portions which are described as testaceous in the male, are piceo-testaceous in the female. *Under surface* entirely piceous, except the anterior trochanters and the posterior margins of the abdominal segments, which are testaceous. Posterior two pairs of *legs* entirely piceous, the anterior pair piceo-testaceous, with a piceous stripe along the dorsal edge of the femora. Last sternite relatively flat, glabrous, and shining, as in *smithi*, the coarse pubescence confined to the neighborhood of the margins, the apical notch narrow and short, extending about one-fifth the length of the segment.

Length: male, 2.3 mm.; female, 2.5 mm.

Holotype, male, and *allotype*, female, collected by Mr. J. W. Green, "Deer Creek Canyon, Colorado, VII-13-39."

Described from a series of 17 specimens (including the *paratypes*), 5 males and 12 females, 15 of them collected by Mr. Green at Deer Creek and Coal Creek Canyons, Colorado, and 2 by Mr. John Woodgate in the Jemez Mts., New Mexico.

The five males show a marked range of variation in the color of the head, which is all black in the type; fully colored, as in the males of *smithi* and *morulus*, with the yellow frontal trilobed area, in two specimens, and intermediate in the other two, with the central lobe of this area reduced to an isolated yellow spot. The legs vary from all piceous, in the type, to a tricolored condition in one specimen, with the posterior pair piceous, the middle pair piceo-testaceous and the anterior pair testaceous. In three of the male paratypes the posterior two pairs are piceous and the anterior pair piceo-testaceous. In no case are they as pale as in the males of *smithi*. The legs in most of the female paratypes are colored as in the type; in several they are uniformly piceous and in one specimen the anterior two pairs are piceo-testaceous.

This form has been confused with *morulus* (Lec.) and it is largely for that reason that I am now calling attention to it. Males with the fully colored head superficially resemble *morulus* more than they do *smithi* and could only be separated from the former by the very minute apical notch of the pygidium. The female secondary sexual characters, however, show unmistakably that the form is more closely related to *smithi*, of which it is a darkly colored variant. Since none of this dark form has been found, to my knowledge, in the territory inhabited by *smithi*, British Columbia, and no typical *smithi* in Colorado or New Mexico, I am treating it as a geographical race or subspecies. Further material may reduce its rank to that of a mere color variety.

A. greeni, new species. *Male*. Elongate, moderately widened behind. Black, surface shining, without sooty luster. *Head* short, inserted almost to the eyes, tempora straight; black, the entire clypeus, mentum, maxillae and ligula testaceous, the labrum, genae, gula, palpi and tips of the mandibles piceous; surface shining, feebly tri-impressed, sparsely and minutely punctulate and pubescent. *Antennae* almost attaining the middle of the elytra, moderately serrate, piceous, the under surface of the first three joints slightly paler. *Prothorax* quadrate, the sides parallel, the angles all broadly rounded, one-fourth wider than long, the surface finely punctulate, with moderately sparse, semidecumbent brown pubescence. *Elytra* evenly and finely punctate, scarcely at all rugose.

with uniformly distributed, almost erect, blackish-brown pubescence, the hairs longer and darker than in *morulus* and producing a slightly shaggy appearance; erect black setae, if any, not clearly differentiated from the rest of the pubescence. Pygidium and a portion of the penultimate tergite exposed, the former with sides almost straight, converging posteriorly, the apex broadly, triangularly emarginate. *Under surface* piceous, the prosternum, mesosternal epimera and trochanters piceo-testaceous, the narrow margins of the first four ventral segments testaceous. The last sternite is composed of two lateral lobes, which do not reach the apex of the pygidium, each lobe with a semicircular, hairy indentation in the terminal two-fifths and with the apex broadly emarginate. *Legs* piceous, with the ventral surface of the anterior pair piceo-testaceous. Lobe of the second protarsal joint darker and smaller than usual in the genus, scarcely reaching the end of the third joint, not perceptibly broadened distally, the apex obliquely rounded and with the usual black apical border almost obsolete.

Female. Similar to the male in size, shape, color and luster and scarcely more dilated posteriorly. The *head* and antennae are similarly colored, which is not the case in any of the other three species of the *morulus* group; the antennae are feebly serrate, much shorter than those of the male, passing the posterior border of the thorax by only one or two joints. *Under surface* similar in color, except that the second, third and fourth abdominal segments are broadly membranous and pale in the center and the anterior two pairs of legs are piceo-testaceous beneath. The last sternite is thin, strongly concave and closely applied to the ventral surface of the pygidium, the apex not reaching that of the latter segment, the anterolateral angles tumid, the median line finely carinate, the apex bisinuate and minutely notched at the tip.

Length: male and female, 2.75 mm.

Holotype, male and *allotype*, female, collected by Mr. J. W. Green, "Wind Gap, Pennsylvania, VII-26-47."

Described from a series of 38 specimens (including the *paratypes*), 13 males and 25 females, collected by Mr. Green at Wind Gap, Pennsylvania, Barnegat Bay, Atison, Cape May, Wading River and Phillipsburgh, New Jersey, and Black Mt., North Carolina. Specimens identified by Mr. Frost as belonging to this species, in the type series of *morulus* (Lec.), are labeled "Lake Superior," "Middle States," District of Columbia, and "Baldwin, Florida."

This species is the *morulus* II mentioned above and, as stated,

is mixed with *morulus* (Lec.) in the collections of the U. S. National Museum, the Museum of Comparative Zoology, the Academy of Natural Sciences of Philadelphia and probably many others. Both male and female are easily and unmistakably separated from *morulus*, as well as from the allied *smithi* and *coloradensis*, by the characters of the genital segments given in the above key.

The amount of variation, considering the size of the series, is surprisingly small. In most of the males, the legs are colored as in the type; in a few specimens they are uniformly piceous except for the trochanters and in one they are piceous with the basal one-third of all the femora piceo-testaceous. In two they are piceous with the anterior and the middle coxae and the basal half of all the femora testaceous, and in one unusually dark specimen even the trochanters are piceous. The aedeagus is smaller than in *morulus*, with a recurrent crown of bristles arising from the distal end of the cylindrical sheath. In the females, the clypeus tends to be paler than in the males, yellow rather than testaceous and the lower border of the front, adjacent to the clypeal suture, is indefinitely paler. The legs in most females are uniformly piceous, in several are colored as in the type, in one the middle pair are darker than in the type and the anterior pair lighter, producing a definite contrast; in two, the basal half of the anterior femora and anterior coxae alone are piceo-testaceous. In one unusually dark female, the clypeus becomes piceo-testaceous.

A. texanus, new species. *Male*. Elongate, definitely widened behind. *Head*, short, black, shining, the eyes prominent, the clypeus, labrum, and a trilobed area comprising almost the anterior half of the front, yellow. The middle lobe of this area is wider than the lateral lobes and extends two-fifths of the distance from the clypeal suture to the occiput, the lateral lobes reaching the middle of the eyes and being continuous with the yellow genae and lower mouth-parts; the palpi piceous, the tempora short, not converging behind the eyes, the surface with a few minute punctures and sparse, moderately long, white pubescence. *Antennae* long, feebly serrate, attaining about the anterior fourth of the elytra, piceous, the first four or five joints testaceous beneath. *Prothorax* testaceous, with a broad longitudinal band, occupying the central one-third and not quite reaching either the apical or the basal margin, blackish piceous; oval, one-fifth wider than long, the sides parallel, feebly arcuate, the angles all broadly rounded, the acute edge interrupted at about the posterior third of the lateral margin, leaving the

anterior two-thirds of this margin obtusely rounded, the surface shining, finely punctulate and with white pubescence. *Elytra* thin, translucent, piceous, with the lateral, sutural and apical margins pale testaceous, the lateral pale margins slightly dilated just before the middle, the apical margins broad and the sutural margins widely dilated to form an ovoid, pale, depressed area, blunt and almost truncated anteriorly and pointed posteriorly, which extends from just behind the scutellum almost to the apical pale borders, but is not continuous with the latter and which extends laterally midway from the suture to each lateral margin; the surface shining, finely punctured and covered with a rather sparse, white, semidecumbent pubescence. The last two tergites are exposed, the propygidium piceous, the pygidium testaceous on the margins, with the basal portion piceous, both with several long, black, bristly hairs near their margins. *Under surface* black; the narrow prosternum, mesosternal epimera and the margins of the sternites yellow; the last sternite testaceous, completely divided into two rounded lobes and overhung by the pygidium. *Legs* testaceous; the anterior femora with a piceous streak along the ventral edge; the middle femora piceo-testaceous, the posterior black; the coxae black, with their tips and all the trochanters yellow; all the tarsi infusate toward their tips, the lobe of the second joint reaching the distal end of the third, its tip black and obliquely truncate.

Female. Similar to the male, except that the antennae are shorter, scarcely at all serrate; the head is entirely black posterior to the clypeal suture; the elytra more strongly widened behind, with the pale pubescence more prominent and an irregular row of dark, erect setae along their lateral and apical margins. Three tergites are completely exposed beyond the elytra, all black, with the posterior border of all except the pygidium yellow. The last sternite is black, triangular, the apex rounded and entire, larger than the corresponding segment in the male. The tarsi are unmodified.

Length: male, 2.0 mm.; female, 3.0 mm.

Described from a series of 7 males, 6 females, collected by Mr. J. W. Green at "Marfa, Texas, VII-12-11." *Holotype*, male; *allotype*, female, and four paratypes in the author's collection; seven *paratypes* in the collection of Mr. Green.

The amount of variation shown in the series is small. Some of the males have the pygidium entirely yellow and show the row of bristles along the elytral margins seen in the allotype. In others there are scattered black hairs over the elytral discs, which is prob-

ably the case in all fresh specimens. One male has the dark thoracic stripe dilated to cover most of the surface, which thus becomes piceous, with all the margins broadly pale; two other males show both of the exposed tergites testaceous. The aedeagus, extruded in one male, consists of a straight cylindrical sheath, from the end of which projects the bristle-like intromittent organ. The same specimen has a piceous spot in the middle of each pale thoracic margin. In one male the legs are entirely testaceous, except the posterior femora, which are piceous with the tips testaceous. Of the female paratypes, one shows a yellow area surrounding, and including, each antennal fovea. The legs in the females tend to be darker than in the males, all the femora and tibiae becoming piceous to piceo-testaceous in the darkest specimens. One female has the median dark thoracic stripe reduced to an elongated spot and the pale area on the elytral disc narrowly continuous with the apical pale margins. The tendency is obviously for the thorax to vary toward an all pale condition in the female, and an all black condition in the male. The length varies in the male from 2.0 mm. to 2.6 mm.; in the female from 2.5 to 3.0 mm.

The species runs to the *difficilis-lobulatus* couplet in Horn's key (7) and to *cinctus* in Champion's key (14) to the Mexican and Central American species. *Cinctus* is differentiated at once by its larger size and the fact that the abdomen and the entire base of the elytra are yellow. From *difficilis*, according to specimens so determined in the U. S. National Museum collection, it can be separated by the following characters of that species: clypeus and labrum black (only the membrane connecting the two pale); thorax black, with the basal margin narrowly red; sutural pale border not dilated and continuous with the pale apical border; legs black; pubescence inconspicuous. *Lobulatus*, which it more nearly resembles, possesses the following differential characters: epistoma as in *difficilis*; thorax black, with basal margin and posterior angles yellow; sutural pale border slightly dilated and broadly continuous with the pale apical border; legs black, the anterior pair slightly paler; pubescence inconspicuous; color of margins pale sulphur yellow or ivory, rather than testaceous. *Texanus* undoubtedly occurs in Northern Mexico, but is not included in the "Biologia," since Champion's revision includes all of the species there mentioned.

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ADDENDUM

In the present revision both *Microlipus uniformis* Motschulsky (1859) and *Malachius uniformis* Fall (1910) are included in the genus *Anthocomus*. Fall's later name must then be rejected as a homonym. The new specific name *Anthocomus falli* has been proposed in the key (p. 127) to replace it.

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INDEX

New names and main references in **bold face**; valid generic and specific names in Roman; synonyms in *italics*.

- | | |
|--|--|
| Aeletus, 121, 123, 132 | bipustulatus, Malachius, 119 |
| acutipennis, Anthocomus, 127 | blaisdelli, Anthocomus, 129 |
| aeneipennis, Trophimus, 124 | |
| aeneus, Malachius, 114, 115, 119, 120 | californicus, Anthocomus, 129 |
| aequalis, Anthocomus, 126, 129 | cardiacae, Anthocomus, 116, 119 |
| antennatus, Anthocomus, 128 | Chaetocoelus, 122, 123, 125 |
| Anthocomus, 113, 114, 115, 116, 117, 119, 120, 121, 122, 123, 126 , 132 | cinctus, Attalus, 141 |
| Attalus, 119, 121, 122, 123, 132 | coccineus, Malachius, 119 |
| Attalusinus, 121, 123, 124 | Collops, 121, 122, 123 |
| auritus, Anthocomus, 127, 130 | coloradensis , Attalus smithi, 133, 134, 136 , 139 |
| <i>Hapalorhinus</i> , 117 | contortus, Anthocomus, 127 |
| <i>Malachius</i> , 117 | |
| | difficilis, Attalus, 141 |
| bakeri, Anthocomus, 128, 129 | directus, Anthocomus, 128 |
| basalis, Tanaops, 126 | |
| biguttulus, Anthocomus, 126, 130 | Ebaeus, 122 |
| bipunctatus, Anthocomus, 119, 127, 129 | Elater, 132 |
| | Endeodes, 121, 122, 123, 124 |
| | erichsoni, Anthocomus, 115, 117, 118, 119, 120, 127, 130 |

- falli**, Anthocomus, 127, 129, **142**
Microlipus, 121
- fasciatus, Anthocomus, 116, 117, 118
- flavilabris, Anthocomus, 119, 127, 130
- floricola, Anthocomus, 126, 129
- foveiventris, Attalus, 119
- franciscanus, Anthocomus, 127
- greeni**, Attalus, 133, **137**
- Hapalorhinus*, 115, 117, 120, 121, 126
- horni, Anthocomus, 128, 130
- impressus, Temnosophus, 124
- laevicollis, Anthocomus, 126, 129
- laticeps, Anthocomus, 127
Microlipus, 117, 120, 131
- lobulatus, Attalus, 141
- longicollis, Anthocomus, 129
Microlipus, 114
- macer, Anthocomus, 128
- Malachius, 114, 115, 117, 119, 120, 121, 123, **125**, 126
- Microlipus*, 114, 115, 117, 119, 120, 121, 126
- mimus, Tanaops, 119
- mirandus, Anthocomus, 128
Hapalorhinus, 117, 120, 121
- mixtus, Anthocomus, 129, 130
- moerens, Anthocomus, 129, 131, 132
Microlipus, 114
- montanus, Anthocomus, 129
- morulus, Attalus, 132, 133, 134, 136, 137, 138, 139
Ebaeus, 133
- nigrellus, Acletus, 132
Attalus, 121
- nigrinus, Anthocomus, 129
- nunenmacheri, Tanaops, 125
- oregonensis, Tanaops, 125
- pallifrons, Attalus, 130
- pristinus, Anthocomus, 127, 129
- productus, Anthocomus, 126, 129
- prolixicornis, Anthocomus, 128, 129
Malachius, 114
- Pseudebaeus, 121, 123
- Riddellia, 124
- rotgeri, Anthocomus, 128
- sanguinolentus, Anthocomus, 116, 117, 118
- setosus, Chaetocoelus, 125
- Silis, 132
- smithi, Attalus, 132, 133, 134, 136, 137, 139
- spiniformis*, *Malachius*, 130
- submarginatus, Attalusinus, 122, 124, 125
Ebaeus, 122
- Tanaops, 119, 121, 123, **125**
- Temnosophus, 121, 123, **124**
- testaceus, Tanaops, 125
- texanus**, Attalus, 121, **139**, 141
- theveneti, Anthocomus, 128
- Trophimus, 122, **124**
- ulkei, Anthocomus, 129, 131
- uniformis, Anthocomus moerens var., 129, 131, 132, 142
- utahensis, Anthocomus, 128, 129, 130
- ventralis, Anthocomus, 119, 127, 129
- viridulus, Anthocomus, 126
- yuccae, Anthocomus, 128